



Native and other non-salmonid fishes

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Charge questions #1

- **1.** Can VSP parameters could be applied to the recovery of other native fish species?
- **2.** What alternative parameters can the Panel recommend to assess the trend and status of native fishes?
- **3.** What population/community metrics would the Panel recommend to assess the condition of other native fishes over time.

Charge questions #2

- **4.** Would the Panel recommend grouping the native fishes according to ecological similarities such as life-history, functional groups or habitat associations?
- **5.** Can the umbrella species concept be applied to native fishes.
- **6.** What additional vital rates or population parameters should be monitored?

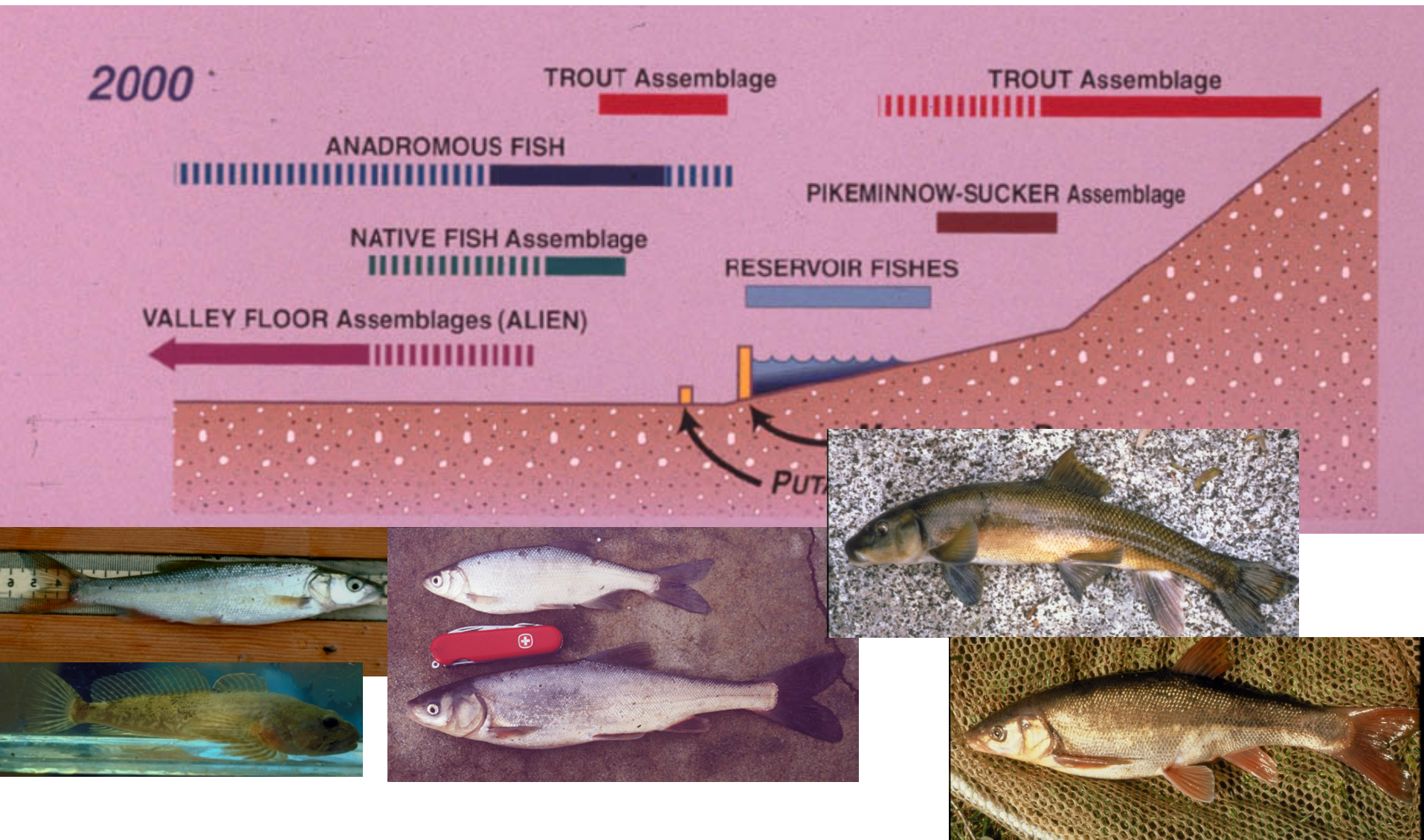
Charge questions #3

- **7.** What criteria or trends would the Panel recommend including as biological goals to determine if the recovery of native fishes is succeeding in the Bay-Delta and its tributaries?
- **8.** What additional habitats or locations should be included beyond the existing monitoring network?

Underlying Question

- How do we know if large-scale actions taken to improve conditions for native fishes, either individually or cumulatively, are doing any good?

Tail Water Fish Assemblage



North Delta Habitat Arc:

Focus for conservation

+ Cosumnes-
Mokelumne corridor

South Delta

Focus on salmon
passage





LISTED DELTA FISHES

- DELTA SMELT
- LONGFIN SMELT
- GREEN STURGEON
- CV STEELHEAD
- CV SPRING CHINOOK
- SAC WINTER CHINOOK



SURFACE



MIDWATER



EDGE



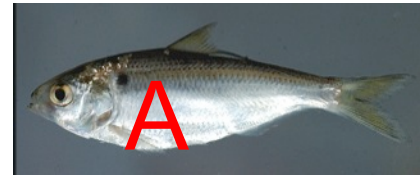
BOTTOM

55 SPECIES - 36 common

SURFACE



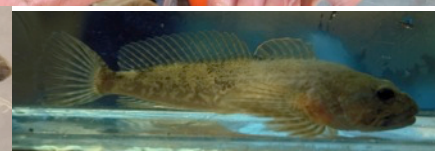
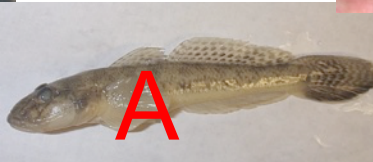
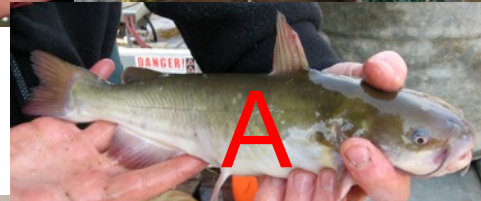
A is for Alien



MIDWATER



EDGE



BOTTOM

Approach: use all species

- Listed Species
- Other Native Species
- Non-native species
 - Positive
 - Negative
 - POD precedent



Data from 18 Surveys

- CDFW egg and larval survey
- CDFW Bay Study midwater trawl
- CDFW Bay study otter trawl
- CDFW fall midwater trawl
- CDFW summer tow net
- CDFW 20 mm trawl
- CDFW Spring Kodiak trawl
- USFWS beach seine
- USFWS Chipps Island trawl
- USFWS Mossdale trawl
- USFWS Sacramento midwater trawl
- USFWS Sacramento Kodiak trawl
- UCD Electrofishing surveys
- UCD Suisun Marsh beach seining
- UCD Suisun Marsh otter trawl
- DWR Yolo Bypass fyke net
- DWR Yolo Bypass beach seine
- Delta pumping plant salvage

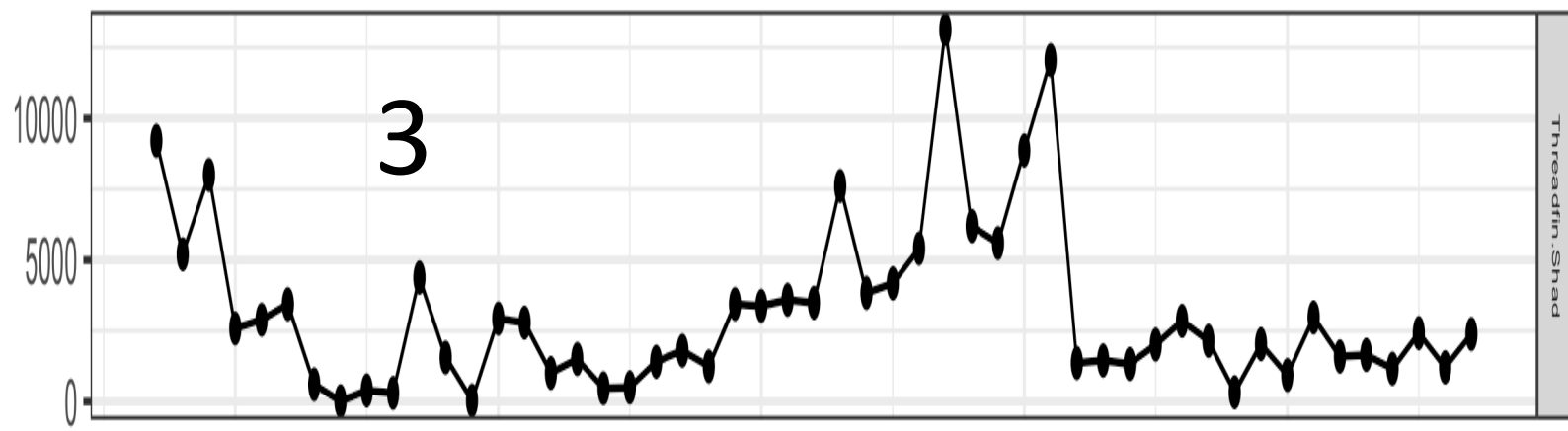
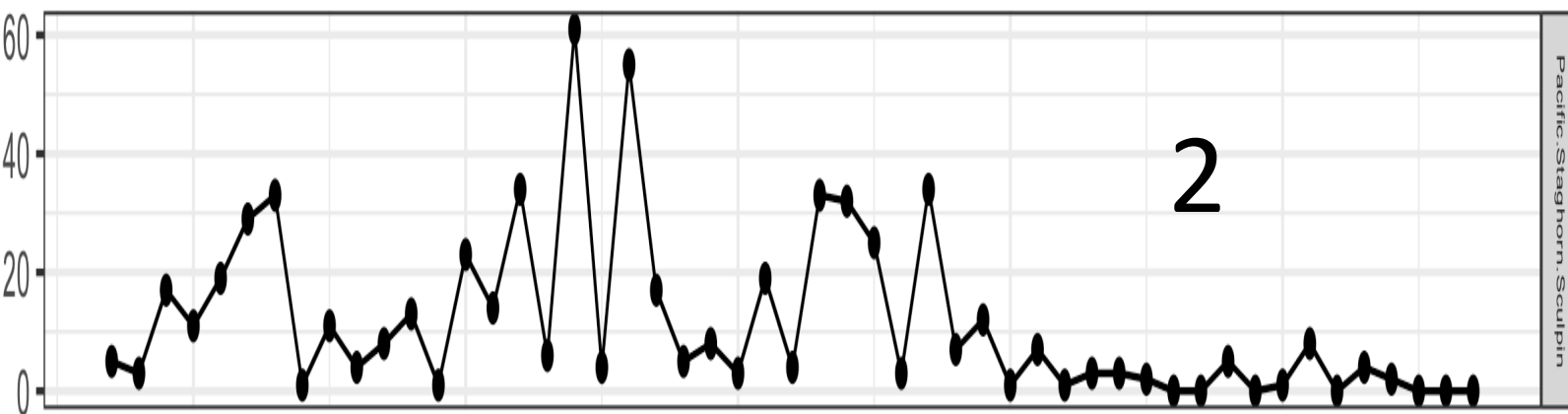
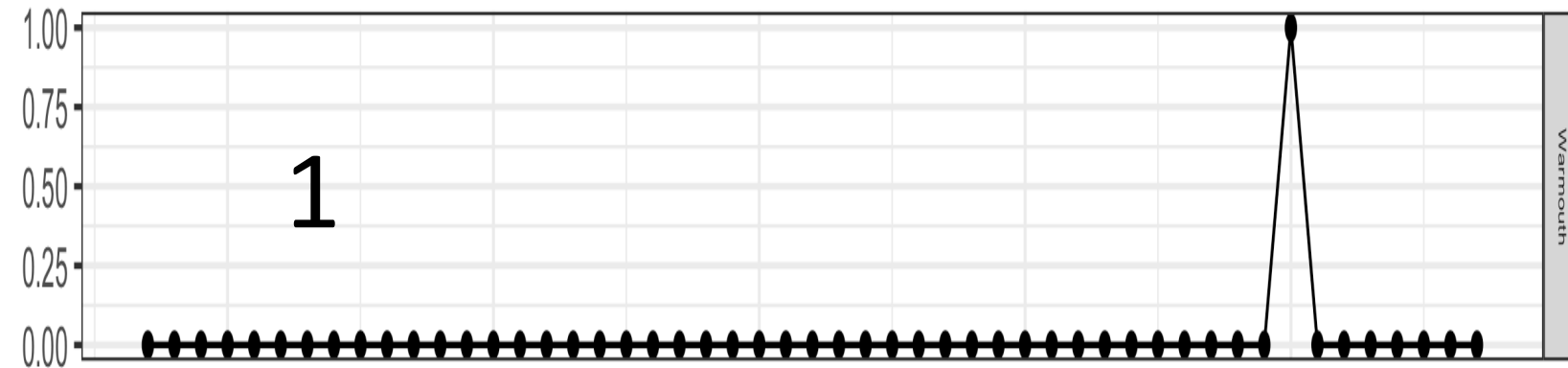
	CDFW Egg and Larval Survey	CDFW Bay Study Midwater Trawl	CDFW Bay Study Otter Trawl	CDFW Fall Midwater Trawl	CDFW Summer Trawl	CDFW 20mm Trawl	USFWS Spring Kodiak Trawl	USFWS Beach Seine	USFWS Chippewee Island Trawl	USFWS Mossdale Trawl	USFWS Sacramento Midwater Trawl	UCD Sacramento Kodiak Trawl	UCD Electrofishing Data	UCD Suisun Marsh Beach Seine	DWR Yolo Bypass Otter Trawl	DWR Yolo Bypass Fyke Trap	Delta Pumping Plant Salvage		
American Shad	3	3	2	3	2	2	3	3	3	2	3	1	0	1	2	2	1	3	Rankings
Bigscale Logperch	1	0	2	1	1	2	1	3	1	1	1	1	1	1	1	1	3	3	0 = No Catch
Black Bullhead	0	1	1	0	0	1	1	1	1	1	1	1	1	2	2	1	2	2	1 = Low Catch
Black Crappie	0	1	1	1	1	1	1	2	1	2	1	1	1	3	2	3	3	3	2 = Moderate Catch
Bluegill	0	1	1	1	1	1	1	3	1	3	1	1	3	1	1	1	3	3	3 = High Catch
Channel Catfish	0	1	2	2	1	3	1	1	1	2	1	1	0	1	2	3	1	3	
Chinook Salmon*	0	2	1	2	1	2	2	3	3	3	3	3	1	1	1	1	2	3	
Common Carp	0	1	1	2	1	2	1	2	2	1	1	1	1	3	3	3	2	1	
Delta Smelt*	1	3	2	3	3	3	3	1	3	1	1	1	0	3	2	0	1	3	
Goldfish	0	1	1	1	1	1	0	2	1	1	1	1	1	2	2	1	1	1	
Green Sturgeon*	1	1	2	1	1	0	0	0	1	0	0	0	0	1	1	0	0	2	
Green Sunfish	0	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	2	2	
Sacramento Hitch*	0	1	1	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1	
Largemouth Bass	0	1	1	1	1	1	1	3	1	2	1	1	3	0	0	1	2	3	
Longfin Smelt*	1	3	3	3	3	3	2	1	3	1	1	1	0	3	3	1	1	2	
Mississippi Silverside	1	1	1	2	2	1	1	3	1	3	1	2	3	3	2	1	3	3	
Pacific Lamprey*	1	1	2	1	1	1	1	1	1	3	1	2	0	1	1	1	1	0	
Pacific Staghorn Sculpin*	1	2	0	2	1	2	1	3	2	0	0	0	0	3	3	0	1	1	
Prickly Sculpin*	1	1	2	1	1	3	1	2	1	1	0	0	1	3	3	1	2	3	
Redear Sunfish	0	1	2	1	0	1	1	3	1	2	1	1	3	1	1	1	2	3	
Sacramento Blackfish*	0	1	0	1	0	1	1	2	1	1	1	1	1	1	1	2	2	2	
Sacramento Pikeminnow*	0	1	0	1	1	1	2	3	1	2	1	2	1	1	1	2	2	2	
Sacramento Sucker*	0	1	1	1	1	2	0	3	1	2	1	1	1	3	3	2	1	2	
Shimofuri Goby	1	2	3	2	2	1	2	3	2	2	0	0	1	3	3	0	2	3	
Sacramento Splittail*	0	2	2	2	1	2	2	3	3	3	1	1	1	3	3	3	2	3	
Spotted Bass	0	0	1	1	0	0	1	2	1	2	1	1	0	0	0	1	1	0	
Steelhead*	0	1	1	2	1	0	3	2	3	3	1	2	0	0	0	1	1	3	
Striped Bass	3	2	3	3	3	3	2	2	3	2	1	1	1	3	3	3	2	3	
Threadfin Shad	2	3	2	3	3	3	3	3	3	3	2	3	2	3	3	2	3	3	
Threespine Stickleback*	1	1	2	2	2	3	3	3	2	1	1	1	0	3	3	1	1	3	
Tule Perch*	0	1	3	1	1	1	1	3	2	1	1	1	3	3	3	1	2	3	
Warmouth	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	2	3	
Western Mosquitofish	0	0	1	1	1	1	0	3	1	1	1	1	1	1	1	1	3	3	
White Catfish	0	0	2	3	3	3	1	1	1	3	1	1	1	3	3	3	2	3	
White Sturgeon*	1	2	2	1	1	1	0	0	2	0	0	0	0	2	2	2	1	2	
Yellowfin Goby	1	2	3	2	1	3	1	3	3	1	1	1	1	3	3	1	2	3	

* indicates native species

36 species

18 surveys

Fall Midwater Trawl



Indicator Species

- Sensitive to changing conditions
- Represent other species
- Current system using listed species
- Native or non-native



Indicator Species (best)

- Use different parts of Delta
- Present year around
- Large populations so change detectable
- Multiple sampling programs
- Life history understood
- Similar requirements to native species
 - If non-native
 - Esp. for listed species

Assemblages

- Multi-species approach
 - Habitat data (summarized)
 - Survey data
- Group by similar habitat preference
 - Pelagic, vegetated edge, etc.
- Group by diverse habitat preferences
 - Encompass wide range of conditions
 - Focal species concept



Habitat Assemblages (examples)

- Delta pelagic fishes (+)
- Delta benthic fishes (+)
- Warmwater resident fishes(-)
- Suisun Marsh (nursery) (+)
- Invasive species (-)
- Tailwater river, native species assemblage (+)

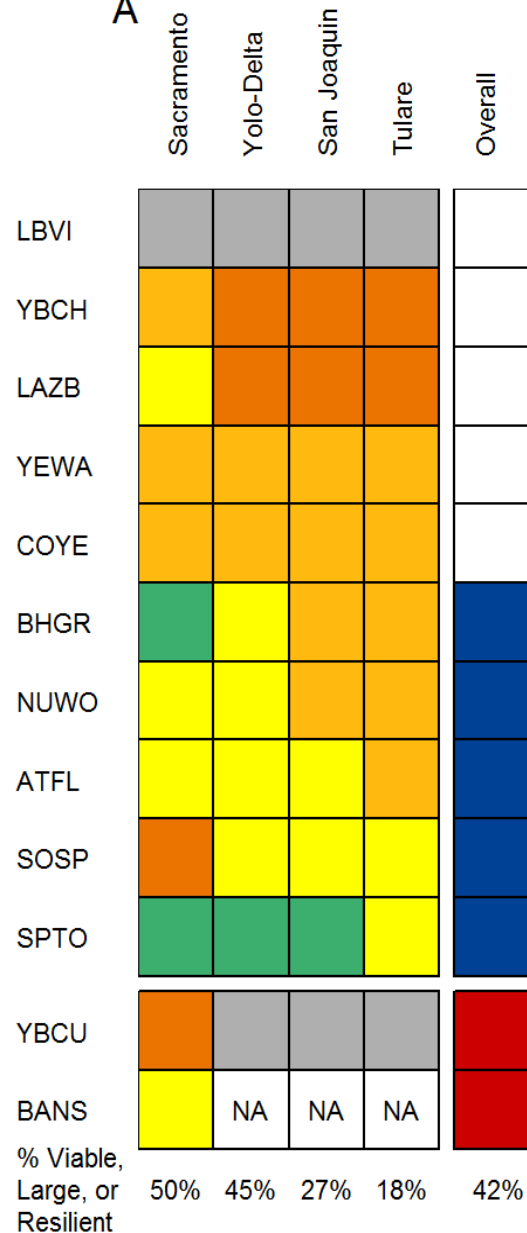


Focal Species

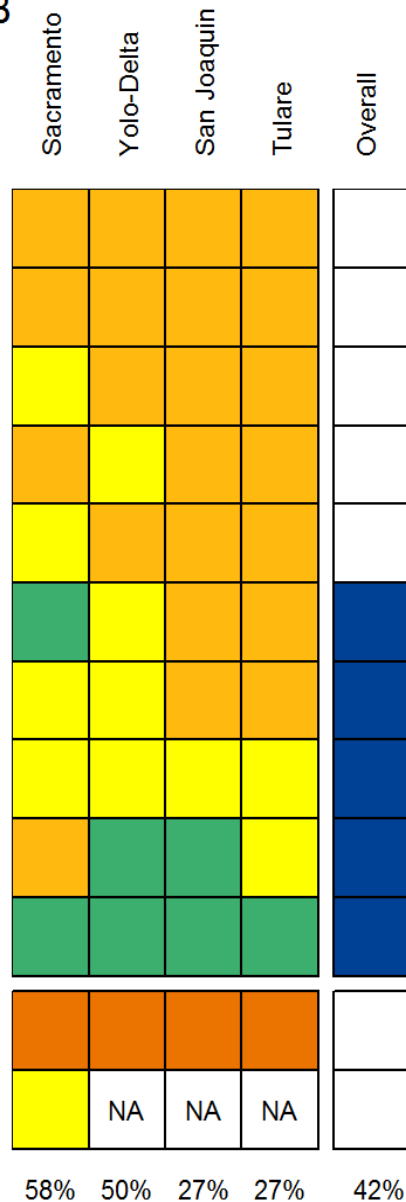
- Developed for birds
- A group of species that have habitat requirements that encompass the range of conditions found in the desired habitat type.
- E.g. riparian forest, tidal marsh
- Used to project success of restoration projects

PRESENT CONDITIONS.....DESIRED (FUTURE) CONDITIONS

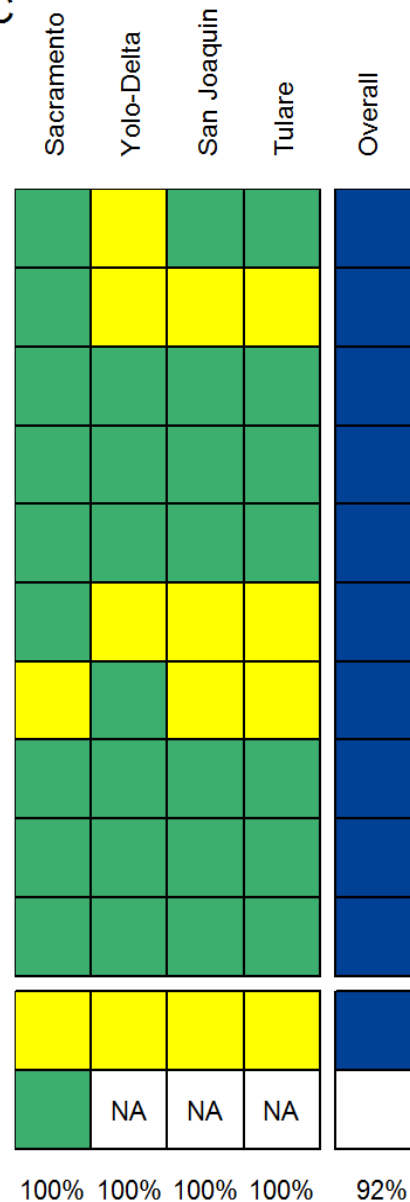
A



B



C



Population status key

Extirpated (~0)
Very Small (<1,000)
Small (<10,000)
Viable (>10,000)
Large (>50,000)

Resilient
Steeply Declining
Neither





Alternative: Fish Performance Metrics

- Length/weight (condition factor)
- Growth
- Histopathological condition
- Recruitment and mortality rates
- Etc. BUT LARGELY NOT AVAILABLE
 - Except for salmonids

Conclusions -Delta

- Data available (36 sp, 18 surveys)
- Non-salmonids less studied
- Multispecies approaches desirable
- Important to use data from all species
- Combine fish monitoring with ecosystem assessments
- Fish metrics best for long-term changes
 - Hard to use for annual or less